

Cottonwood, Az. BPL Trial System **Radio Frequency Interference Report**

Sponsored by:
Verde Valley Amateur Radio Association
BPL Interference Committee

Introduction:

Upon discovering that Cottonwood, Arizona had been selected as a Broadband Over Power Lines (BPL) test site sponsored by Electric Broadband and Arizona Public Service, the Verde Valley Amateur Radio Association appointed a special committee to study the effects of Broadband Over Power Lines (BPL) to the HF spectrum and most importantly to the Amateur Radio frequency allocations.

A series of tests have been conducted starting in January, 2004 to the present time in order to demonstrate the extent to which BPL signals, from the trial system, interfere with Amateur Radio Communications in the Medium Frequency (MF) and High Frequency (HF) radio spectrum. The data in this report was collected using normally installed antennas for both mobile operations and fixed site operations. With the exception of the spectrum analyzer tests the radio equipment used for these test results are real world, readily available amateur radios that are commonly available on the market today.

Tests by the NTIA have been conducted to show either compliance of BPL systems to applicable FCC Part 15 limits or to model or demonstrate the area over which interference from typical BPL trial system emissions occurs or may occur. While Part 15 contains measurement standards and electromagnetic limits (which are not addressed by this report), it is the intent of this report to assess compliance with Part 15 in its entirety. The Amateur Radio Service is an FCC licensed service under Part 97 of the FCC regulations. The BPL system currently being tested by Electric Broadband and Arizona Public Service is regulated by Part 15 of the same FCC regulations. Part 15 of the FCC regulations clearly stipulates that "Parties responsible for equipment compliance should note that the limits specified in this part will not prevent harmful interference under all circumstances." (15.15 General Technical Requirements. (C)) and that "Operation of an intentional, unintentional or incidental radiator is subject to the conditions that no harmful interference is caused..." (15.5 General Conditions Of Operation. (B)).

The subject tests of this paper were performed using the actual installed antennas of the Amateur Radio stations. The test approach correctly characterizes the harmful interference that is affecting these Amateur Radio stations and also correctly characterizes the harmful interference to any fixed or mobile station in the future throughout the Cottonwood area or the rest of the United States if these BPL systems deploy and run this technology over the power lines in every residential or business's back yards.

BPL Test Sites:

At the present time Electric Broadband and Arizona Public Service have set up 2 test sites in the Cottonwood area. One is located at the East end of Cottonwood Street near the Sawmill Cove housing area and East of the Safeway Shopping Center. The GPS location is; Latitude 34 degrees 43 minutes 43 seconds North by Longitude 112 degrees 00 minutes 03 seconds West. These coordinates were taken at the injection point of this test site. The BPL signals run West through overhead power lines to another repeater and then continue through overhead power lines again finally dropping down into underground lines going across the street North to another repeater site within the Sawmill Cove housing area supplying a number of residential customers. This is designated as Sawmill Cove site area #1 in this report.

The second site is located at the American Heritage Academy at the East end of Cherry Street at 2030 E. Cherry Street. The GPS location is; Latitude 34 degrees 43 minutes 57 seconds North by Longitude 112 degrees 00 minutes 15 seconds West. These coordinates were taken at the injection point of the test site. The power lines run underground to a transformer and a repeater located in the front yard of the American Heritage Academy feeding computers within the Academy and also going North on overhead power lines to Birch Street, approximately 1 block, and turn West on Birch Street, still on overhead power lines along Birch Street to another repeater site. From there the lines go into the Birch Street Apartments for residential use. This site and area is referred to in this report as site #2 American Heritage Academy and site #2 Birch Street Apartments.

Test Results:

The received signal levels in this report are typically expressed in terms of receiver signal-strength meter S units. Although S meters are not absolutely standardized on receivers used in the Amateur Radio Service, most receivers use the following standard for S-meter readings:

S9 = 50 microvolts = -103 dbW across 50 ohms. Each S unit represents a change of 6 db.

S9 -103 dbW

S8 -109 dbW

S7 -115 dbW

S6 -121 dbW

S5 -127 dbW

S4 -133 dbW

S3 -139 dbW

S2 -145 dbW

S1 -151 dbW

Some of the S meter readings in this report also include a "Q" factor. This generally represents the quality of the received signal. A signal that is Q5 may be weak, but it is at least 10 db greater than the ambient noise level, so is perfectly intelligible. A signal that is Q1 is audible, but just above the noise level.

Broadband Over Power Lines Interference Test Results

The actual BPL interference test results were done in the vicinity of the BPL test site power lines, injection points and repeaters as would be typical if these power lines and equipment were running down the backyards of normal residential or business locations. This was done intentionally to reflect interference levels to a typical fixed site Amateur Radio location. Distances to the BPL equipment noted range between 30 feet out to approximately 70 feet unless otherwise noted in each one of the individual exhibits.

The reports taken from the fixed site location of David Kiggins, KB7KMR, were recorded at distances of 0.56 miles from BPL site #1- Sawmill Cove and 0.71 miles from BPL site #2- American Heritage Academy. These distances were determined by the use of a GPS unit. (GPS unit nomenclature: Magellan Sport Trac- 8 satellites were locked 2 of which were WAAS satellites).

The following exhibits correctly characterize the extent of BPL interference taking place to any licensed or unlicensed radio service that is operating within the vicinity of the BPL test sites in the frequency range of 1.8 Mhz through 30 Mhz. It is also noted that while recording these readings attempts were made to contact other Amateur Radio Stations and in most cases communications could not be carried on because of the overwhelming BPL interference.

Equipment used to record these readings is typical Amateur radios that are readily available on the market today and antennas used are typical antennas used by Amateur Radio Operators in mobile operations and in fixed site use.

As seen in the following exhibits, BPL interference in the vicinity of the test sites far overpowers typical noise levels recorded in the Cottonwood area as demonstrated and recorded in the baseline reports mentioned earlier. They even overpower worst case situations of power line noise as recorded directly under main power lines throughout Cottonwood and at the APS sub-station.

The power lines have been turned into radiating long wire antennas throughout the test area and are creating severe interference to licensed users of the 1.8 Mhz to 30 Mhz frequency spectrum. It should also be noted that if this technology is allowed to deploy in Cottonwood or any other place not only will this interference be radiating from the power lines but also the electrical wiring within the residence or business location as BPL is running through unshielded lines which will radiate just as an antenna does. The interference levels are clearly seen in the following exhibits.

BPL Interference Test Results Exhibit #1

The following report was recorded on May 31, 2004 by Mike Kinney, KU7W and Norm Vandiver, N7VF between 9:00AM and 1:00 PM.

Equipment Used was as follows:

Receiver- Icom IC 706MK11 solid state
Mode- SSB
Bandwidth- 2.4 Khz filter
Pre-amp- Off

Antenna:

Hustler 54inch mast with 400 watt resonators for each band tested mounted on right rear bumper of 2003 Chevrolet pickup.

Feedline:

Coax was 18 feet of RG-58 with a velocity factor of 66% and rated loss of 4.5 DB at 100 feet.

Site #1

Signal strength readings were taken at the injection point from 3.587 Mhz through 29.204 Mhz. Signal strength

Signal strength readings were taken at the repeater point on 3.89 Mhz through 4.001 Mhz.

Signal strength readings were taken 1/10 of a mile from the repeater point on 3.89 Mhz through 3.994 Mhz, 7.041 Mhz through 7.306 Mhz, 21.105 Mhz through 21.448 Mhz and 28.185 Mhz through 29.204 Mhz.

Signal strength readings were also taken throughout the Sawmill Cove housing area which is all underground lines on 29.063 Mhz and ranged from S-5 through S-7 on the radio.

Site #2

Signal strength readings were taken at the injection point on 28.026 Mhz through 29.119 Mhz.

Signal strength readings were taken at the repeater point on 3.748 Mhz through 4.000 Mhz, 7.020 Mhz through 7.303 Mhz, 10.057 Mhz, 14.016 Mhz through 14.348 Mhz, 18.057 Mhz through 18.120 Mhz, 21.044 Mhz through 21.449 Mhz, 24.937 Mhz, and 29.162 Mhz through 29.200 Mhz.

Signal strength readings were also taken at 1/10 of a mile from the repeater point on 29.026 Mhz and were S-7.

Signal strength readings were taken at 2/10 of a mile from the repeater point on 29.026 Mhz and were S-0 but were still very audible.

Signal strength readings were taken at 3/10 of a mile from the repeater point on 29.026 Mhz and were S-0 but still audible.

Signal strength readings were taken at 4/10 of a mile from the repeater point on 29.026 Mhz and were S-0 but still audible.

Signal strength readings were taken at 5/10 of a mile from the repeater point on 29.026 Mhz and were S-0 but still audible.

Signal strength readings were taken at the Birch street apartments within 60 feet of the repeater point on 3.748 Mhz through 4.000 Mhz, 7.028 Mhz through 7.303 Mhz, 10.057 Mhz, 14.016 Mhz through 14.348 Mhz, 18.057 Mhz through 18.120 Mhz, 21.044 Mhz through 21.449 Mhz, 24.937 Mhz and 29.162 Mhz through 29.200 Mhz.

Site of Injection	at Repeater	1 Mile from Repeater	Sawmill Cove*
28.185	28.185	28.185	28.185
28.184	28.184	28.184	28.184
29.103	29.103	29.103	29.103
29.204	29.204	29.204	29.204
24.98	24.98	24.98	24.98
24.93	24.93	24.93	24.93
24.916	24.916	24.916	24.916
21.448	21.448	21.448	21.448
21.302	21.302	21.302	21.302
21.105	21.105	21.105	21.105
14.317	14.317	14.317	14.317
14.098	14.098	14.098	14.098
18.105	18.105	18.105	18.105
10.003	10.003	10.003	10.003
10.048	10.048	10.048	10.048
10.098	10.098	10.098	10.098
7.308	7.308	7.308	7.308
7.217	7.217	7.217	7.217
7.041	7.041	7.041	7.041
3.984	3.984	3.984	3.984
3.936	3.936	3.936	3.936
3.89	3.89	3.89	3.89
3.704	3.704	3.704	3.704
3.587	3.587	3.587	3.587

Site of Injection		at Repeater		Distance from Repeater		Birch Street Apartments	
FREQUENCY Mhz	Signal Strength	FREQUENCY Mhz	Signal Strength	FREQUENCY Mhz	Signal Strength	FREQUENCY Mhz	Signal Strength
29.119	20db/S9	29.2	S8	.1 Mile		29.2	S4
28.599	20db/S9	29.162	10db/S9	29.026	S7	29.162	S8
28.397	10db/S9						
28.194	20db/S9	24.937	S1	.2 Mile		24.937	S0
28.026	20db/S9			29.026	Q5 S0		
		21.449	S7			21.449	S5
		21.416	S9	.3 Mile		21.416	S7
		21.359	S9	29.026	Q1 S0	21.359	S7
		21.044	S8			21.044	S8
				.4 Mile			
		18.12	S5	29.026	Q2 S0	18.12	S3
		18.057	S4-S5			18.057	S2-S3
				.5 Mile			
		14.016	S7	29.026	Q1 S0	14.016	S5
		14.147	S9			14.147	S7
		14.2	S8			14.2	S8
		14.239	S8			14.239	S8
		14.3	S9			14.3	S7
		14.348	S9			14.348	S7
Measurements made with							
ICOM 706 MII G.							
SSB filter width 2.4 KHZ		10.057	Q2 S2			10.057	S0
Pre-amp off							
Antennae: Hustler 54" mast		7.303	S8			7.303	S4
with 400W resonators for		7.249	S8			7.249	S4
each band.		7.2	S8			7.2	S4
Mounted on a 2003 Chevrolet		7.154	S8			7.154	S4
Silverado pickup, right rear		7.068	S8			7.068	S4
bumper. 15' of RG58 coax.		7.04	S8			7.04	S4
		7.026	S8			7.026	S4
		4	Q1 S0			4	S0
		3.975	S3			3.975	S1
		3.957	S5			3.957	S3
		3.927	S6			3.927	S4
		3.9	S7			3.9	S5
		3.892	S8			3.892	S6
		3.852	S6			3.852	S4
		3.748	S3			3.748	S1

BPL Interference Test Results Exhibit #2

The following report and attached e-mail was recorded by Ernie Cummings, K6XF on May 31, 2004 at 10:45 AM and on June 8, 2004 at 9:30 AM.

Equipment used is as follows:

Receiver- Panasonic RF-2000 8 band shortwave receiver 1.7 Mhz through 30 Mhz double superhetrodyne (Rated Excellent Receiver)

Antenna- 38 inch whip incorporated into the receiver.

Distance from power distribution line 20 to 2500 feet. At 20 feet signal was max meter Scale and at 2500 feet signal was half scale.

**Report of Harmful Interference From a Broadband Over Power Line Transmission
COTTONWOOD, ARIZONA 86326**

Name of complainant: Floyd E. Cummings (Ernie)

Call sign: K6XF

Station location: 133 Lampliter Village

City, State, Zip: Clarkdale, AZ 86324

Telephone: 928-649-3562

Email: ernie@cummings.net - k6xf@commspeed.net

Description of Interference: Strong interference over-riding WWW on 10 & 15 Mhz

The 20 meter Amateur Radio Band on USB reception was unusable due to BPL

Description: Mobile operation with a Panasonic RF-2200 Receiver 8 Band

1.7 to 30 MHZ double Superhetrodyne (rated excellent HF receiver)

Antenna: 38 inch Whip

Distance of antenna from power distribution line: 20 to 2500 feet

. At 20 feet signal was max meter scale at 2500 feet signal half scale

Log of interference:

Date	Time MST	Frequency Mhz	Receive Mode	Interfering signal strength	Description
5-31-04	10:45 AM	11.4 to 16	AM	Meter Full scale	Continuous broadband carrier with Modulating data sounds 2030 Cherry St Cottonwood, AZ
6-08-04	9:30 AM	10 to 16	AM	Meter Full scale	Continuous broadband Carrier with Modulating Data sounds 1600 Block Cottonwood Street Cottonwood, AZ 86326

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BPL Interference Test Results Exhibit #3

The following report was recorded by Mike Kinney, KU7W and Norm Vandiver, N7VF on June 4, 2004 approximately 8:00PM to 10:30 PM.

Equipment used is as follows:

Receiver- Icom IC706MK11G solid state
Mode- SSB
Bandwidth- 2.4 Khz filter
Pre-amp- Off
Antenna- Hustler 54 inch mast with 400 watt resonators for each band mounted on right rear bumper of 2003 Chevrolet pickup.
Feedline- 18 feet RG-58 with velocity factor of 66% and rated loss of 4.5 DB at 100 feet.

Site #1 Sawmill Cove:

Signal strength readings were taken at the injection point from 3.587 Mhz through 4.001 Mhz, 7.041 Mhz through 7.306 Mhz, 10.003 Mhz through 10.048 Mhz, 18.105 Mhz through 18.162 Mhz, 14.098 Mhz through 14.308 Mhz, 21.105 Mhz through 21.448 Mhz, 24.916 Mhz through 24.999 Mhz and 28.185 Mhz through 29.204 Mhz.

Traveling on Mingus View Street away from the injection point, readings were taken on 3.936 Mhz to distances out as follows:

1/10 mile- S-9+ 10DB
2/10 mile- S-9
3/10 mile- S-9
3 ½ / 10 mile- S-8
4/10 mile- S-3
5/10 mile- S-1 but very audible

Site #2 American Heritage Academy:

Signal strength readings were taken at the repeater point on SSB from 3.748 Mhz through 4.000 Mhz, 7.028 Mhz through 7.303 Mhz, 14.016 Mhz through 14.348 Mhz, 21.044 Mhz through 21.449 Mhz and 28.600 Mhz through 29.200 Mhz.

Signal strength readings were also taken at the repeater point in the AM mode which produced higher S meter readings on 29.195 Mhz, 28.010 Mhz and 14.200 Mhz than in the SSB mode.

Subject: BPL

Mike & Norm....

Today, Monday May 31 beginning at 0945 I drove over to two of the BPL locations in Cottonwood, one with overhead power lines and one with underground power lines.

And with my Shortwave HF receiver and a small whip antenna, I tuned the HF spectrum and heard the broadband signal at S-9+ at both locations. Driving at a 90 degree angle from the overhead lines it continued for 0.2 of a mile.

I discovered that if I looked for the transformers at the underground AC power cable location, that is where I got the S-9 signal. Anywhere that there was a transformer that fed the underground cables, it pegged the meter.

My receiver is not one for gathering data, however it is valid in that it is commonly used by SWL folks, and the interference was at locations on the HF band that shortwave listeners would be tuning, the BPL made that part of the HF Band unusable, it wiped out the use of those shortwave frequencies.

Ernie Cummings - K6XF
webmaster@vvara.org
Website: www.vvara.org

6/1/2004

Signal strength readings were also taken at the repeater point in the FM mode which produced yet higher S meter readings on 29.195 Mhz, 28.010 Mhz, 14.200 Mhz and 14.500 Mhz.

RF Measurements of BPL at Cottonwood, Arizona 6/4/04 Site #1

Site of Injection		*3.936 MHz	
FREQUENCY Mhz	Signal Strength	Miles from Injection Site	Signal Strength
28.185	S8	Traveling on Minugs View Street, away from the Injection Site	
28.194	S8		
28.54	S8		
28.782	S9		10/S9
29.103	S7		S9
29.182	S8	.1 mile	S9
29.204	S1	.2 mile	S8
		.3 mile	S8
		.35 mile	S3
		.4 mile	S1 Q5
		.5 mile	
24.999	S9		
24.93	S9		
24.916	S9		
21.448	S5		
21.302	S6		
21.105	S5		
14.098	S7		
14.201	S9		
14.218	S7		
14.241	S7		
14.308	S6		
18.105	S0 Q2		
18.162	S0Q5		
10.003	S5		
10.048	S3		
7.306	high noise	Measurements made with ICOM 706 MII G. Sideband filter width 2.4 KHZ Preamp Off	
7.217	from		
7.041	atmosphere		
3.587	10/S9	Antenna: Hustler 54" mast with 400W resonators for each band. Mounted on a 2003 Chevrolet Silverado pickup, right rear bumper. 18' of RG58 coax.	
3.704	20/S9		
3.89	60/S9		
3.936*	40/S9		
3.953	40/S9		
3.994	30/S9		
4.001	40/S9		

At Repeater		AM Mode		FM Mode	
FREQUENCY MHz	Signal Strength	FREQUENCY MHz	Signal Strength	FREQUENCY MHz	Signal Strength
29.2	S6	29.195	20/S9	29.195	60/S9
29.162	S9				
28.6	S8	28.01	30/S9	28.01	60/S9
21.449	S7				
21.416	S8				
21.359	S8				
21.044	S7				
14.016	S8				
14.147	S8				
14.2	S7	14.2	S9	14.2	30/S9
14.239	S8				
14.3	S7			14.5	20/S9
14.348	S7				
7.303	High noise				
7.249	from				
7.2	atmosphere				
7.154					
7.068					
7.04					
7.028					
4					
3.976					
3.957					
3.927					
3.9					
3.892					
3.862					
3.748					

Measurements made with ICOM
706 Mill G.
Sideband filter width 2.4 KHz
Preamp Off
Antenna: Hustler 54" mast with
400V resonators for each band.
Mounted on a 2003 Chevrolet
Silverado pickup, right rear
bumper. 16' of RG58 coax.

Site #2: Lat: 34 43 57" N Long: 112 00' 15" W

BPL Interference Test Results Exhibit #4

The following report was recorded by Mike Kinney, KU7W on June 6, 2004 from 1:00 PM through 5:00 PM local time using different modes.

Equipment used is as follows:

Receiver-	Icom IC706MK11G solid state
Mode-	SSB, CW, AM & FM
Bandwidth-	2.4 Khz filter SSB and CW, 8.00 Khz – AM, 8.00 Khz- FMN & 12.00 Khz- FM
Pre-amp-	Off
Antenna-	Hustler 54 inch mast with 400 watt resonators for each band mounted on right rear bumper of 2003 Chevrolet pickup.
Feedline-	18 feet RG-58 with velocity factor of 66% and rated loss of 4.5 DB at 100 feet.

It should be noted that as the radio was changed to different modes the signal strength of the BPL signals intensified dramatically as a result of wider bandwidth being used in the radio to accommodate different modes.

At both sites, in some modes, BPL signals completely pegged the radio meter at S-9+ 60DB making it virtually impossible to hear any stations that may be calling in those particular modes regardless of how much power they may be using as the BPL signals had completely saturated radio receiver.

BPL Signal Strength Readings using different modes.
Recorded June 6, 2004 from 1:00pm local through 5:00 pm local time in the
Cottonwood, Az. Area.

Radio and antenna information:

Icom 706Mk II G

Preamp off

Selectivity: 3.00 khz SSB, CW

8.00 khz AM

8.00 khz FMN

12.00 khz FM

Hustler Antenna- 54 inch mast bumper mounted located right rear corner 2003 Chevrolet pickup. Using 400 watt resonators for each band

Coax is 18 feet RG 58. Rated loss 4.5DB at 100 feet. Velocity Factor- 66%.

Signal readings were taken by the following and were at the BPL sites

Mike Kinney KU7W

1652 E. Sierra Drive

Cottonwood, Az. 86326

BPL Site #1- Sawmill Cove Area Repeater

<u>Freq. in Mhz</u>	<u>SSB</u>	<u>CW</u>	<u>AM</u>	<u>FM</u>
28.045	S-0	S-0	S-5	S-2
28.250	S-0	S-0	S-5	S-3
28.450	S-1	S-0	S-4	S-3
28.650	S-0	S-0	S-2	S-2
28.850	S-0	S-0	S-1	S-2
29.000	S-0	S-0	S-0	S-2
29.050	S-0	S-0	S-1	S-2
29.200	S-0	S-0	S-0	S-0
29.300	S-0	S-0	S-0	S-0
29.350	S-0	S-0	S-0	S-0
24.900	S-9	S-9	S9+20	S9+60
24.960	S-9	S9+10	S9+20	S9+60
24.990	S9+10	S-9	S9+20	S9+60
21.045	S-5	S-6	S-7	S-8
21.200	S-6	S-1	S-7	S-7

<u>Freq. in mhz</u>	<u>SSB</u>	<u>CW</u>	<u>AM</u>	<u>FM</u>
21.300	S-2	S-5	S-7	S-7
21.400	S-5	S-0	S-6	S-7
21.450	S-3	S-5	S-7	S-6
18.059	S-0	S-0	S-3	S-1
18.121	S-0	S-0	S-0	S-0
18.180	S-0	S-0	S-0	S-0
14.010	S-6	S-6	S-0	S-0
14.150	S-2	S-7	-	-
14.250	S-8	-	S-5	-
14.300	S-8	S-7	S-9	S9+10
14.350	S-7	S-7	S-9	S9+20
10.000	-	S9+10	S9+30	S9+60
10.057	S-9	S-9	S9+10	S9+60
10.130	S-9	S-9	S9+10	S9+60
7.060	S-3	S-4	S-4	-
7.102	S-2	-	-	-
7.200	S-0	-	-	-
7.250	-	-	-	-
7.300	S-3	-	-	-
3.600	S-9	S-9	S9+30	S9+60
3.510	S9+10	S9+10	S9+20	S9+60
3.772	S9+20	S9+10	S9+30	S9+60
3.803	S9+10	S9+10	S9+30	S9+60
3.850	S9+20	S9+30	S9+60	S9+60
3.890	S9+30	S9+40	S9+60	S9+60
3.900	S9+30	S9+30	S9+60	S9+60
3.930	S9+20	S9+30	S9+60	S9+60
3.950	S9+10	S9+10	S9+40	S9+60
4.000	S9+10	S9+10	S9+40	S9+60

BPL Site #2 American Heritage Academy Repeater

<u>Freq. in mhz</u>	<u>SSB</u>	<u>CW</u>	<u>AM</u>	<u>FM</u>
28.045	S9+10	S-9	S9+30	S9+60
28.250	S9+10	S9+10	S9+30	S9+60
28.450	S-9	S-9	S9+20	S9+60
28.650	S-8	S9+10	S9+20	S9+60
28.850	S-8	S9+10	S9+20	S9+60

<u>Freq. in mhz</u>	<u>SSB</u>	<u>CW</u>	<u>AM</u>	<u>FM</u>
29.000	S9+10	S9+20	S9+30	S9+60
29.200	S-7	S-6	S-9	S9+10
29.350	S-4	S-4	S-7	S-5
24.900	S-4	S-3	S-7	S-4
24.960	S-3	S-3	S-7	S-4
24.990	S-1	S-1	S-7	S-2
21.045	S-9	S-9	S9+20	S9+60
21.200	S9+10	S-9	S9+20	S9+60
21.300	S-9	S-9	S9+10	S9+60
21.400	S-8	S-8	S9+10	S9+60
21.450	S-8	S-9	S9+10	S9+40
18.059	S-5	S-5	S-8	S-4
18.121	S-5	S-4	S-8	S-6
18.180	S-5	S-0	S-7	S-5
14.010	S-8	S-7	S9+10	S9+60
14.150	S-8	S-9	S9+20	S9+60
14.250	S-9	S-8	S9+20	S9+60
14.300	S-9	S-8	S9+10	S9+60
14.350	S-7	S-8	S9+10	S9+60
10.000	S-7	S-7	S-9	S9+30
10.057	S-6	S-5	S-8	S9+10
10.130	S-6	S-6	S-8	S-9
7.060	S-6	S-5	S-7	S-9
7.102	S-6	S-6	S-8	S-9
7.200	S-6	S-6	S-7	S-9
7.250	S-6	S-5	S-7	S-9
7.300	S-6	S-5	S-7	S-8
3.772	S-5	S-5	S-6	S-6
3.803	S-5	S-5	S-6	S-7
3.850	S-5	S-5	S-8	S-9
3.890	S-7	S-6	S-9	S9+40
3.900	S-7	S-7	S-9	S9+30
3.930	S-5	S-5	S-7	S-9
3.950	S-4	S-4	S-6	S-6

BPL Site #2 Birch Street Apartments Repeater

<u>Freq. in mhz</u>	<u>SSB</u>	<u>CW</u>	<u>AM</u>	<u>FM</u>
28.045	S-4	S-6	S-8	S-9
28.250	S-4	S-5	S-6	S-8
28.450	S-6	S-6	S-8	S9+20
28.650	S-6	S-7	S-9	S9+30
28.850	S-6	S-8	S9+10	S9+60
29.000	S-8	S-7	S9+10	S9+60
29.050	S-8	S-8	S9+10	S9+60
29.200	S-3	S-2	S-7	S-4
29.300	S-0	S-0	S-3	S-2
29.350	S-0	S-0	S-2	S-1
24.900	S-0	S-0	S-6	S-0
24.960	S-0	S-0	S-5	S-2
24.990	S-0	S-0	S-6	S-2
21.045	S-6	S-6	S-8	S-9
21.200	S-7	S-6	S-9	S9+10
21.300	S-6	S-7	S-8	S9+20
21.400	S-7	S-6	S-9	S9+20
21.450	S-6	S-7	S-9	S9+20
18.059	S-0	S-0	S-5	S-0
18.121	S-0	S-0	S-6	S-0
18.180	S-0	S-0	S-6	S-2
14.010	S9+20	S9+10	S9+30	S9+60
14.150	S9+20	S9+30	S9+40	S9+60
14.250	S9+30	S9+20	S9+40	S9+60
14.300	S9+30	S9+20	S9+40	S9+60
14.350	S9+10	S9+20	S9+40	S9+60
10.000	—	—	—	—
10.057	—	—	—	—
10.130	S-0	S-0	S-4	S-2
7.060	S-9	S-8	S9+20	S9+60
7.102	S-9	S-9	S9+20	S9+60
7.200	S-9	S-9	S9+10	S9+60
7.250	S-8	S-8	S-9	S9+40
7.300	S-7	S-7	S-9	S9+20
3.772	S-0	S-0	S-6	S-2
3.803	S-0	S-0	S-5	S-3
3.850	S-0	S-0	S-6	S-5

<u>Freq. in mhz</u>	<u>SSB</u>	<u>CW</u>	<u>AM</u>	<u>FM</u>
3.890	S-4	S-4	S-7	S-7
3.900	S-4	S-5	S-6	S-6
3.930	S-0	S-0	S-0	S-0
3.950	S-0	S-0	S-0	S-0

BPL Interference Test Results Exhibit #5

The following report was recorded by Norm Vandiver, N7VF, on June 17, 2004 at 11:50 AM while using mobile operations at Birch Street and 16th street in Cottonwood.

Equipment being used:

Radio- Elecraft K-2 solid state

Mode- USB

Bandwidth- 2.2 Khz filter

Pre-amp- On

RF-Gain- Maximum

Antenna- Hustler vertical with 54 inch mast and 10 meter 1000 watt resonator mounted on left front fender of 1987 Chevrolet pickup.

Distance from power line distribution line and equipment- Approximately 2,288 feet.

Frequency being used at the time to communicate with another station was 28.500 Mhz.

Log of interference: N7VF

Date	Time	Frequency	Receive Mode	Interfering signal strength	Description
June 17 04	1150 AM	28500	USB	55	BPL Carrier with Modulation Clicking.
		This covered a spectrum from 28300 MHz to 29120 MHz with levels up to 58 on the S meter of the Elecraft K-2 Transceiver.			

The tests being run have a serious flaw.
Propagation from an open Long Wire Antenna
is being Ignored?

N7VF

Norman Woudriver

In response to "ET #04-37" NPRM

Report of Harmful Interference From a Broadband Over Power Line Trial

or Deployment

Name of complainant: Norman W Vandiver

Call sign (if applicable): N7VF

Station location: Mobile at Birch St & 16th Cottonwood AZ
86322

Mailing address (if different): 1862 arena Del-Loma

City, State, Zip: Camp Verde AZ 86322

Telephone: 928-567-9881 Email: N7VF@Kachina.net

Description of Interference: Carriers spaced 1.6 KHz from 28300

thru out the spectrum of 28300 to 29.120 MHz with

Modulation clicking. Much worse on FM than SSB.

Description of station: Vertical-mounted Hustler Vertical 54" with 10 meter
resonator. This antenna is connected to my Elecraft K2-Transceiver.

Receiver(s) affected: Elecraft K-2 ^{Mode, Upper Side, Filter #1 option (2.2 KHz)}
pre amp on, RF gain Max.

Antenna type: Hustler Vertical 54" With 10 meter resonator

Antenna location: Mounted on Left Front Fender of Chev Pick-Up 1987

Distance of antenna from own house (feet): _____

Distance of antenna from neighboring houses (feet):

Distance of antenna from power distribution line or equipment

(feet): approx 2288'